THIRD ORDER SUSCEPTIBILITY OF SILVER SULFIDE SOL

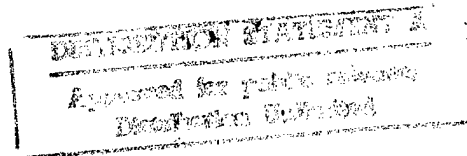by

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Third Order Susceptibility of Silver Sulfide

A silver sulfide sol was prepared by mixing equal concentrations of a silver sol with a sulfur sol. The mixture was stirred for 30 minutes until there was no further change in color.

The sulfur sol was prepared by dissolving solid sulfur in hydrazene followed by addition of distilled water. The mixture was heated at 75 °C for 30 minutes to allow the sol to develop.

The silver sol was prepared by reduction of silver nitrate with a mixture of 10% dextrin and 10% sodium hydroxide. The mixture was stirred for 30 minutes.

The UV-Visible spectrum of the silver sulfide sol is shown in Figure 1. The concentration of this sol was 1.9 x 10^{-5} M.

The phase conjugate signal intensity was measured using degenerate four-wave mixing (DFWM). The experimental arrangement used for these measurements is shown schematically in Figure 2. Briefly if consisted of a lens A which focuses the beam on the sample. The optical density filter B was used to vary the intensity of all three beams. Beam splitters BS1 (5%T) and BS2 (50%T) were used to generate the probe, front pump and back pumped beams respectively. All beams arrive at the sample simultaneously. The beamsplitter BS3 is used to pick off the conjugate signal which is then focused on a photodiode detector and displayed on a Tektronix 2465 300 MHz oscilloscope. The beam intensity was measured by another detector placed between the sample and the back pumped beam and displayed on another Tektronix oscilloscope.
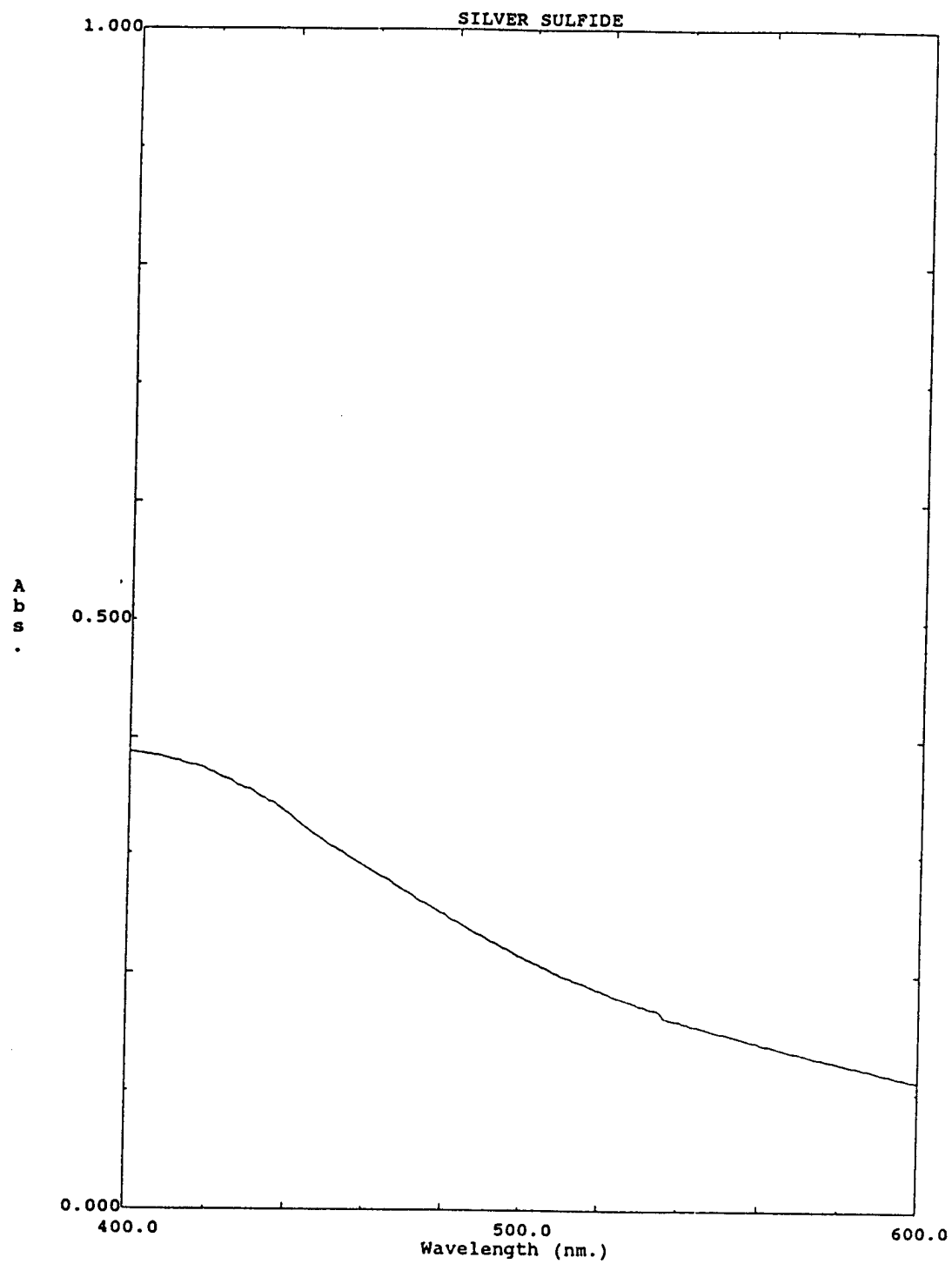
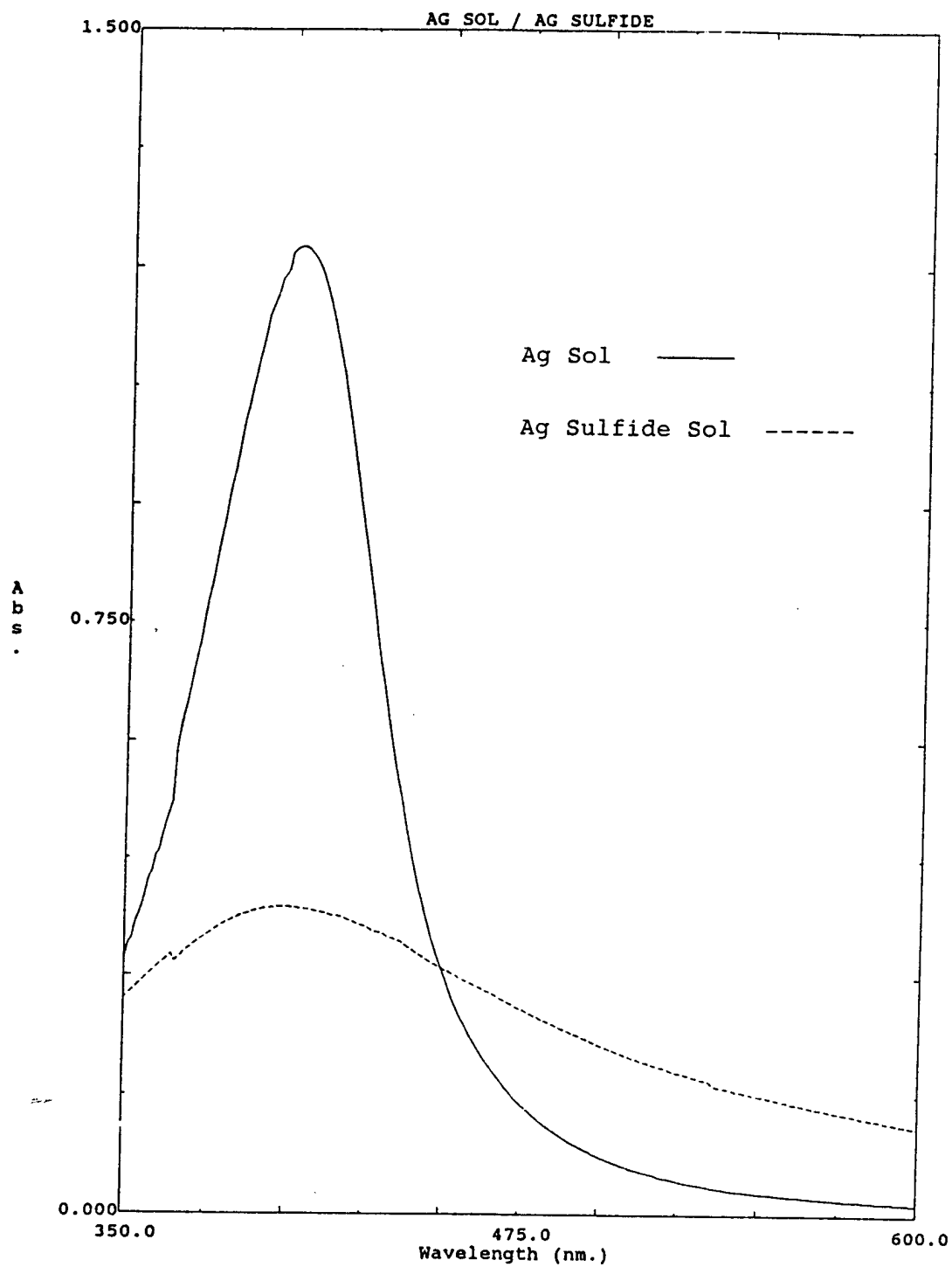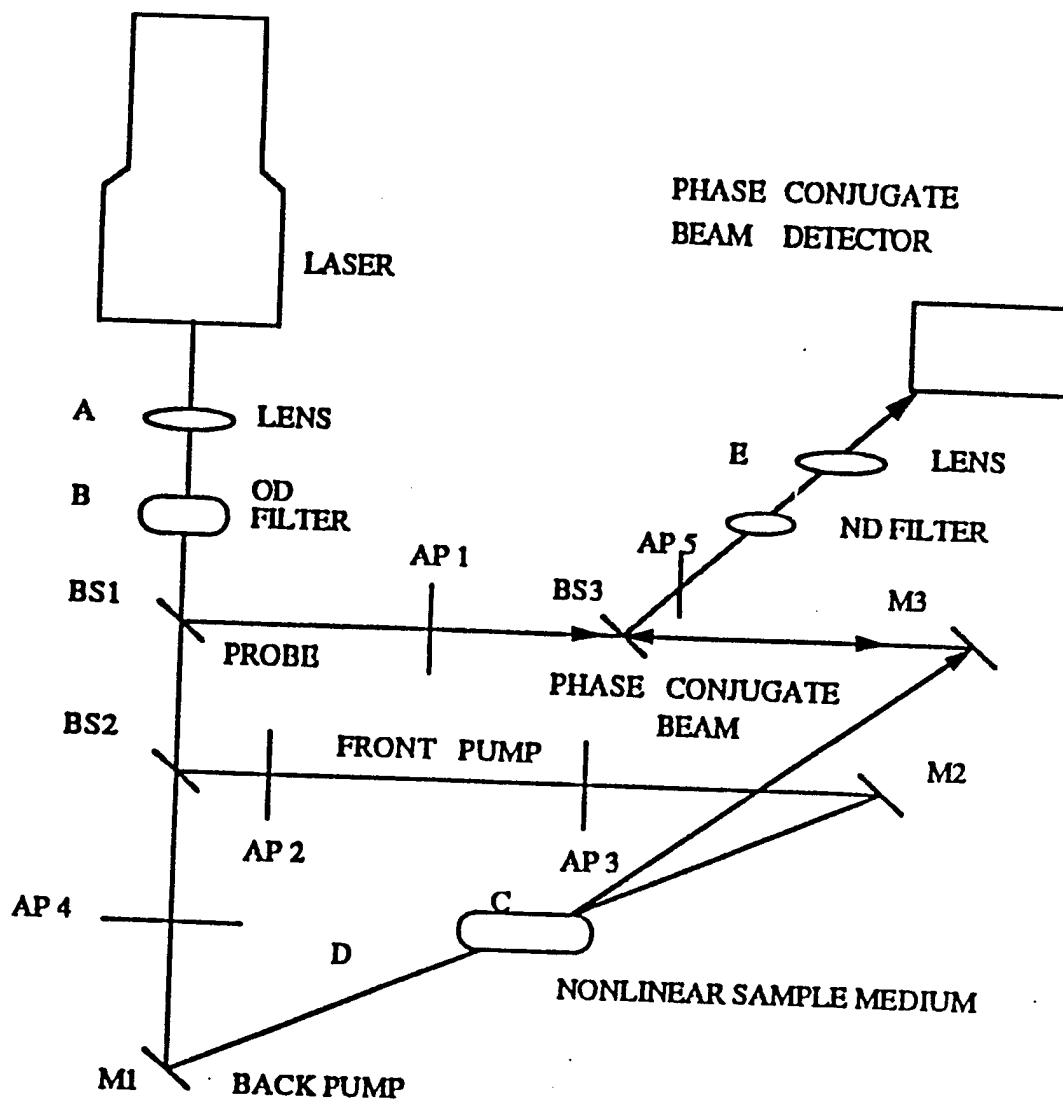SILVER SULFIDE

FIGURE 1.

FIGURE 1A.

FIGURE 2. Experimental Arrangement for Degenerate Four-Wave Mixing

The value of the phase conjugate signal intensity used in these calculations was obtained from a log-log plot of phase conjugate signal intensity versus laser intensity. A log-log plot of phase conjugate signal intensity versus laser power was also made for carbon disulfide which was used as a reference standard in these experiments.

The value of X^3 for silver sulfide was 5.4 x 10^{-12} esu.